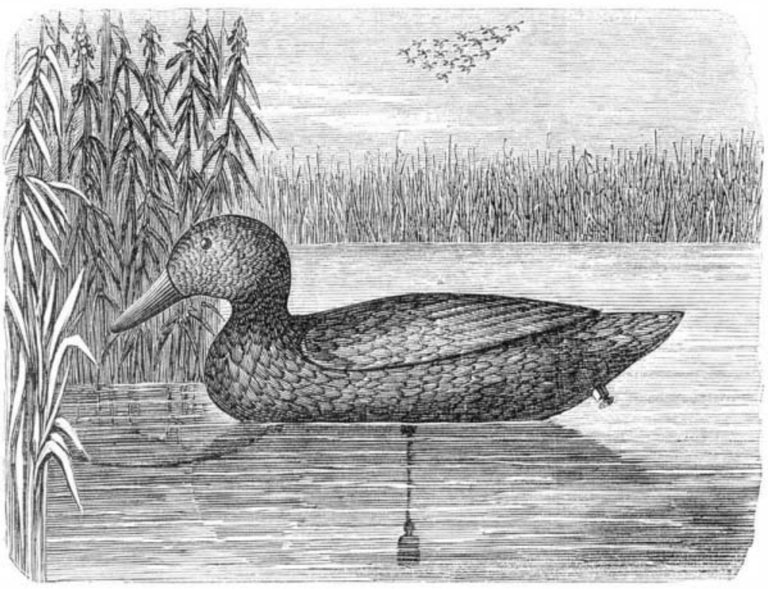
FOSTER'S INDIA-RUBBER DECOY DUCK.

This is a rubber duck of full size, and accurately formed. When not in use it can be collapsed by allowing the air which distends it to escape through a valve provided for that purpose and through which it is also inflated when it is wanted for use.

A ballast weight is fixed to the center of the belly. The resemblance to a real duck is very striking. Sportsmen will appreciate this invention, and the convenience afforded by the portability of these decoys over the old cumbersome wooden ducks. A dozen may be packed so as not occupy more space than a single wooden one.



Patented August 3, 1869, by Jacob Foster, who may be addressed for further information, 328 Colowhill street, Philadelphia, Pa.

DIFFICULTIES TO BE SURMOUNTED IN WORKING THE SUEZ CANAL.

We find in *Lippincott's Magazine*, a paper from the pen of Edward B. Grubb, relating "what he saw of the Suez Canal during a trip from Timsah to Port Said last winter. In this article we find set forth some of the difficulties to be surmounted in the navigation of this canal, which though possibly not insuperable, must more or less obstruct trade for some time to come. We make some extracts from this interesting narrative particularly bearing upon this subject:

"Where the canal enters Timsah from the north the cuttings are deep, and the great heaps of sand lie on either side sixty or seventy feet high. The channel through which the water runs is not one hundred feet wide and the depth not over twelve feet. Hydraulic engines of enormous power were at work dredging up and pouring out immense volumes of mud and sand. Hundreds of men, mostly Arabs, with barrow, pick, and shovel, were moving the huge heaps, or waist-deep in the water, turning from our path their uncouth boats; for much traffic is even now done upon the canal, and besides the boat-loads of stores and provisions belonging to the company, we saw many a cargo that reminded us of the sutlers' stores in the 'Army of the Potomac.'

"The Timsah cutting extends for perhaps half a mile, and then the desert is scarcely above the level of the water, and in fact in many places it is below it, so that the water covers many hundreds of acres, and the course of the canal is buoyed out sometimes for nearly a mile. As we left the hills of Timsah the wind struck us sharply, and ever and anon a quantity of the light sand of the desert would be caught up by it and sent whirling into the water; and looking closely, we could see where it had drifted little capes and promontories into the canal. Let us repeat what our captain said upon this subject, being asked:

"'Yes, monsieur, this drifting in of the sand certainly seems to be one of our greatest difficulties, for the wind blows across the canal all the year round—six months one way, six months back. One ounce of sand per square yard amounts to five hundred tuns for the whole canal. If it came in at that rate, it would be a long time before the company would pay any dividend. But we do not intend to let it come in; and this is how we prevent it. This sand only extends to the depth of from nine to twelve feet; below this is a stratum of blue mud, mixed with a sort of clay, in which, by the way, we find great quantities of beautiful shells and fossil fish. Well, then, do you see those two huge engines which we are approaching—one an hydraulic dredger in the middle of the canal, the other an iron *shute* (it looked like the walking beam of an immense steamer), near the edge? Do you see how the vast masses of sand, mud, and water, come up from the dredger, are poured out into the "shute," and thence on the ground sixty or eighty feet from the edge of the canal? Do you see how quickly the great heaps rise, and how they extend, almost without a break, all along? Well, monsieur, you would find these heaps almost immediately baked hard by the sun, and as they are firm enough to bear the railroad we intend putting upon them the better to expedite the mails from India, so we hope they will be high enough to keep out the sand drifts from the canal.

"And what are your other great difficulties, mon captaine?"

"Well, monsieur, at Chalouf, near Serapéum, we have struck a peculiar hard stone at the depth of twelve feet, and are obliged to blast to clear it out (it is axolite). Then the deposit of the Nile mud near Port Said will always keep us dredging. But what we fear most is the Red Sea. For a long distance from Suez it is extremely shallow; then, lower down, it is very rocky; and while this is nothing to steamers, which can easily keep the narrow channel, yet with the wind blowing six months one way and six months the other, it will not be easy for a heavily-laden clipper to keep off the ground. Yet these things will all be set right, for trade will take the shortest route, and the Suez Canal will be a success, although no nation now believes it except France, and (with a bow) America.'

"A few words now upon the canal in general. Whether or not the idea originated with Pharaoh, Napoleon I. acted upon it, and actually had a survey made, when it was reported that there was a difference of thirty feet in the level of the two seas; and for that and other reasons the project was abandoned, and lay dormant until about 1854; upon the 30th of November of which year the contract between the Egyptian government and "Compagnie Universelle du Canal Maritime de Suez" was signed. Its duration is ninety-nine years from the day of the opening of the canal for traffic. The Egyptian government is to receive fifteen per cent of the net profits, and holds a large proportion of the company's bonds. Egypt conceded to the company all the lands which might be irrigated by the fresh-water canal, and in 1868 bought back its own concession for a sum equal to ten millions of dollars.

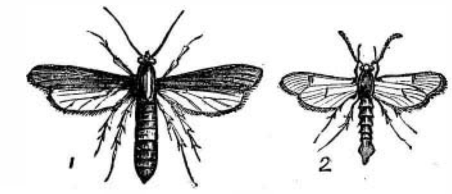
"Kantara is thirty-one miles from Port Said, and the canal is almost perfected thus far; that is to say, although the dredges are still at work, yet for this distance the canal is one hundred yards wide and of an average depth of twenty-six feet; and these are to be the dimensions for its entire length. A curious feature, which is visible along the narrow parts of the canal, is a current flowing in from the north at the rate of one and a half knots per hour. Although it is many months since the water attained its level, yet this current still continues. Our captain attributed it to evaporation and absorption. It must be remembered that all the cuttings have been from the Mediterranean towards Suez, and that the main body of the men employed, numbering eighty-five hundred, are working at the head of the canal, which is now advanced as far as Serapéum. Here it is necessary to cut through a number of sand hills to the Bitter Lakes, which are a series of depressions in the desert, in the lowest parts of which are marshy ponds. They are twenty-five miles in extent, and it is expected that, when the water is let in, an area of one hundred and forty thousand acres will be covered. (This has since been done). Then comes the Chalouf cutting to Suez, sixteen miles, and the seas meet.

"On the 1st of January, 1869, there were at work eighty-five hundred men. These men are obliged by the Egyptian government to work on the canal, but are paid by the company at the rate of two francs per day. The engines for dredging are sixty in number. Each cost two hundred thousand dollars in gold. The expenses amount to one million dollars in gold per month, and the work has already absorbed forty millions of dollars. It is said that the rates of toll are to be ten francs per tun. The company is a private one, and has not been publicly recognized or assisted by the French government.

"With regard to the rocks, the calms, and the tortuous channels of the Red Sea, mentioned before as the chief obstacle to the use of the canal by the larger class of merchantmen, plans have already been elaborated in England, with a view to the building of a class of vessels suited to this trade, and carrying each sufficient steam power to assist her through the canal and down the Red Sea. For the dispatch of mails and the transport of troops, this route will be immediately available; and although it will take time to conquer English prejudices and predilections, yet in time the bulk of the India trade must come this way."

THE PEACH TREE INSECT.

The "Peach Borer" is becoming extinct in many parts of the West, and the peach trees are beginning to thrive again. Mounding up the trees with earth has been long practiced, as a preventive against the borer worm; but writers in the *Entomologist* say it does no good. Peach orchards, where hogs are allowed to run, seem to be kept free from the insect. Lime and ashes are of no value.



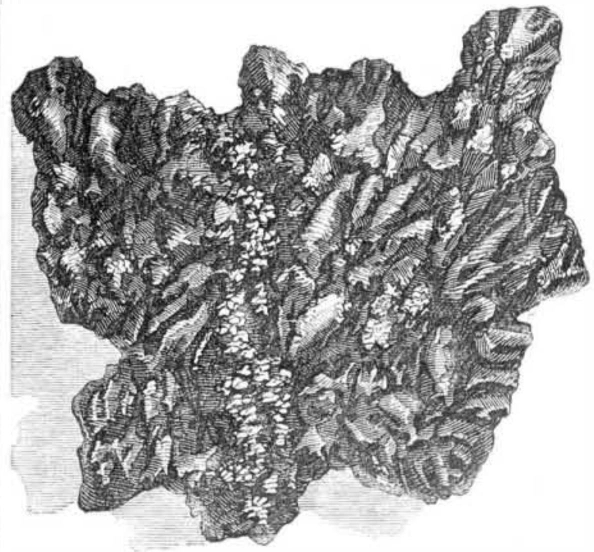
1 2

The above illustration shows the moths of the borer. Fig. 1 is the female; Fig. 2, the male.

Artificial stone is made by mixing sand with a concentrated solution of silicate of soda. The pasty mass thus formed is placed in the mold of the desired shape. It is then dried, but is yet as brittle as biscuit. It is next saturated with a solution of chloride of calcium. In about an hour the chemical change takes place, and the whole mass becomes as hard as stone; finally, it is washed and dried.—*S. Piesse.*

"THE WELCOME STRANGER" NUGGET, FOUND NEAR DUNOLLY, IN AUSTRALIA.

Attention has been already directed to the many large pieces of gold which have been found in the neighborhood of Dunolly; and, when the printing of this work was nearly completed, on the 5th February, 1869, there was unearthed by John Deason and Richard Oates a nugget weighing more than 2,280 oz., 10 dwts., 14 grs. It was found on the extreme margin of a patch of auriferous alluvium trending from Bulldog Reef. According to information furnished by Mr. Knox Orme, it appears that this mass of gold was lying within two feet of the bed-rock (sandstone), in a loose, gravelly loam, resting on stiff, red clay. It was barely covered with earth. It was about twenty-one inches in length and about ten inches in thickness; and, though mixed with quartz, the great body of it was solid gold. The annexed engraving has been reduced from a large sketch made by Mr. Francis Fearn, which was certified by the discoverers as a fair representation of the nugget found by them. Comparing it with a photograph of a sketch made from memory by Mr. Charles Webber, it would appear to represent not incorrectly the outward appearance of the "Welcome Stranger."



It is to be regretted that a cast or a photograph was not made, and the weight and specific gravity of it ascertained when it was first dug out of the ground. The discoverers appear to have heated it in the fire in their hut, in order to get rid of the quartz, and thus to reduce its weight before conveying it to the bank at Dunolly.

The melted gold obtained from it was 2,268 ozs., 10 dwts., 14 grs., but a number of specimens and pieces of gold (weighing more than 1 lb.) were detached from it before it got into the hands of the bank manager; and what was broken off in the hut while it was on the fire, it is useless to guess.

Mr. Birkmyre says: "The gold of this nugget, from the crucible assays, I found to be 98·66 per cent of pure gold. It thus contains only 1-75th of alloy, composed chiefly of silver and iron. The melted gold, with that given away to their friends by the fortunate finders, amounted to 2,280 ozs., or 2,248 ozs. of pure gold—its value at the Bank of England being £9,534."

The neighborhood of Dunolly is almost unprospected country. For many miles there are out-cropping reefs which have yielded very large pieces of gold: and it is not at all improbable that other pieces of gold will be found as far exceeding the "Welcome Stranger" in weight and value as that nugget exceeds any yet recorded.

Near the spot where this mass was found there were unearthed two nuggets weighing respectively 114 ozs. and 36 ozs. Very heavy gold is characteristic of this district; and large nuggets are found nearly every day.—*From R. Brough Smyth's "Gold Fields and Mineral Districts of Victoria."*

THE HOLSTEIN INTERMARITIME CANAL.

EARLY ATTEMPTS FOR DIRECT INTERMARITIME COMMUNICATION.

The idea of constructing ship canals across narrow strips of land, for promoting commerce, is not new. From a work of Antonio Galvao, entitled "*Tratado dos Descubrimentos*," we note the fact that the opening of a ship canal between the Atlantic and Pacific Oceans—"the mightiest event, probably, in favor of the peaceful intercourse of nations which the physical circumstances of the globe present to the enterprise of man"—was proposed to Charles the Fifth in 1528. And, strange as it may seem, the inquiries, instituted at that time, led to the recommendation of the same lines that were planned in 1825. Still older is the project of the opening of ship canal across the Isthmus of Corinth in the Mediterranean. It engaged the attention of Periander, Demetrius, Julius Cæsar, Caligula, Herodes, and Atticus, but it was reserved for Nero to take the first active step toward the accomplishment of this end. He completed a canal half way, as lately ascertained by the explorations of the learned Frenchman, Mons. Grimaud de Caux. This isthmus connects the peninsula of Morea with the province of Attica, in Greece. By means of a canal cutting through this narrow strip of land, the route from the Ionian Sea to the Archipelago would be considerably shortened. Such a canal would be of great importance, as enormous quantities of grain are exported from the borders of the Black Sea to the seaports of the Adriatic.

The project of uniting the Baltic with the North Sea by a navigable ship canal dates from the zenith of Lubeck's commercial prosperity, and was suggested first as early as

1390. This project occupies at the present moment the attention of the North German Parliament, and, being one that may safely be ranked among the gigantic engineering enterprises of the present age, we have endeavored to collect such accurate knowledge with regard thereto as existing sources admit.

WHY THE PROJECT WAS STARTED.

Two reasons call peremptorily for the accomplishment of a navigable route between the North Sea and the Baltic, to wit: gain in time and safety. The distance between the English canal to the open Baltic Sea around the promontory of Skagen is about 880 miles. It would be shortened for two fifths of its whole length if a straight route from one shore of Holstein to the other could be chosen. Steamers would thus be enabled to make the voyage from London to St. Petersburgh in five days, instead of seven, while sailing vessels would gain from one week to one month, according to circumstances.

The second reason for the building of a ship canal is still more important. According to even very incomplete statistical data, the annual number of losses of vessels in that portion of the sea is greater than that of any other equally large portion of the globe. This is the more to be deplored as the route around Cape Skagen is the only one from the North Sea to the coasts of Sweden and Finland, as well as to the very heart of Russia. Indeed, it has been ascertained that the yearly loss experienced on the old sea way amounts to three millions rix dollars, or about two million dollars in gold. This sum is certainly a large one, but it must be remembered that the cargoes of many vessels are exceedingly valuable. For instance, the cargoes of the American bark *Joseph Clark* and the English steamer *Arctic* amounted to half a million dollars in gold; the former vessel was shipwrecked in 1857, and the latter in 1860. These accidents mainly occur on the western coast, especially on the sand banks of Skagen, which, for this reason has been denominated "the graveyard of ships." Indeed, small and large wrecks are seen there in every condition and at every time of the year.

It may be remarked that there are now two channels across the isthmus of Holstein; they are, however, altogether inadequate to the existing demands of navigation. The one is the so-called Strekenitz canal, begun in 1390 and completed in 1398. It is one of the oldest in Europe, and connects the river Elbe with the Trave, uniting with the former just above Lauenburg, and with the latter above Lubeck. The second artificial water communication is known under the name of the Schleswich-Holstein, or Eyder Canal, and may be found on any good map.

THE PROPOSED LINE.

This has been submitted to the world in the form of an anonymously published pamphlet, entitled, "The Cutting of of the Isthmus of Holstein between the Baltic and the North Sea." Lubeck is proposed as the eastern terminus of this route, while it is thought that the most feasible point for the western terminus would be Gluckstadt upon the Elbe. This line, as shown by accurate and reliable surveys, would require no locks. It is proposed to follow the river Trave from Lubeck to a point where it approaches the Hemmelsdorf Lake. This lake belongs to the most remarkable water reservoirs of the Baltic countries; originally an inlet, as most of the other lakes of the Baltic, it is now separated from the sea by a narrow strip of maritime deposits. Hills of about one hundred feet in hight protect it against all winds in such a manner that Napoleon I. designated it for a winter harbor for his Baltic fleet, when, by the catastrophe of 1813, the whole project fell into oblivion. Moreover, this natural harbor is situated in the midst of one of the most populous, prosperous, and best cultivated districts; it is surrounded by a circle of charming villages, and only awaits the completion of the projected canal to become an excellent seaport. The length of the section from this lake to Gluckstadt is forty-eight miles; adding thereto the distances through the lake and from Lubeck to the Baltic, we have a total length of fifty-three miles, or over half the length of the Suez Canal. The cost of the execution of this work, including the construction of harbors at Gluckstadt and Lubeck, has been estimated at $23,720,930, in gold.

Should a work of this kind be executed, a yearly passage of from twenty to thirty thousand vessels through the canal might safely be predicted. Such a strait would open to the ocean the immense territory in Russia; and, besides this, the Prussian coast, which is over half the length of that of France would be made directly accessible to the open sea.

Taken all in all, the cutting of the isthmus of Holstein may safely be contrasted with that of Suez. In shortening an old way of traffic it will contribute of transforming the slow march of civilization in the northern European countries into one worthy of this century of steam.

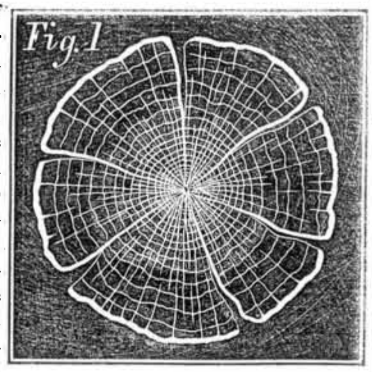
THE CONTRACTION OR SHRINKING OF TIMBER.

In a lecture delivered by John Anderson, C. E., at the "Society of Arts" in London, some information was given on the contraction of timber which we deem of sufficient interest to reproduce from *The Builder*, together with the diagrams illustrative of the subject.

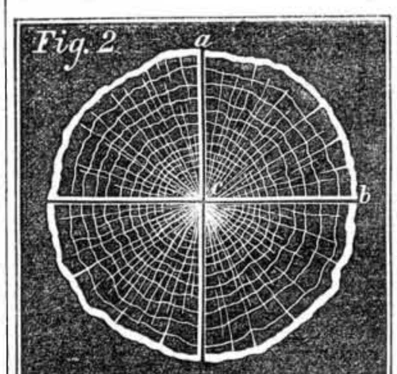
The lecturer, after some introductory remarks proceeded as follows:

The wretched state of the floors, doors, and shutters in many of the London houses too plainly gives ample and complete evidence of persistent disobedience to the natural law of shrinkage, and the only hopeful consolation is that we do not go unpunished, as the penalty inflicted in time may lead to improvement.

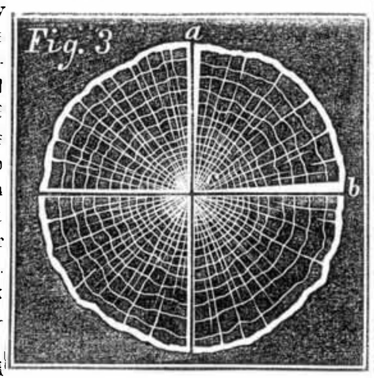
An examination of the end section of any exogenous tree, such as the beech or oak will show the general arrangement of its structure. It consists of a mass of longitudinal fibrous tubes, arranged in irregular circles that are bound together by means of radial strings or shoots, which have been variously named; they are the "silver grains" of the carpenter, or the "medullary rays" of the botanist, and are in reality, the same as end wood, and have to be considered as such, just as much as the longitudinal woody fiber, in order to understand its action. From this it will be seen that the lateral contraction or collapsing of the longitudinal, porous, or tubular part of the structure, cannot take place without first crushing the medullary rays, hence the effect of the shrinking finds relief by splitting in another direction, namely in radial lines from the center, parallel with the medullary rays, thereby enabling the tree to maintain its full diameter, as shown in Fig. 1.



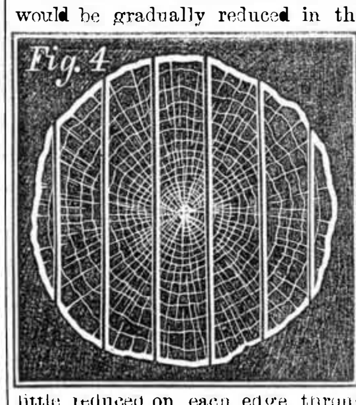
If the entire mass of tubular fibercomposing the tree were to contract bodily, then the medullary rays would of necessity have to be crushed in the radial direction to enable it to take place, and the timber would thus be as much injured in proportion as would be the case in crushing the wood in the longitudinal direction. If such an oak or beech tree is cut into four quarters, by passing the saw twice through the center at right angles, before the contracting and splitting have commenced, the lines *a c*, and *c b*, in Fig. 2 would be of the same length, and at right angles to each other, or, in the technical language of the workshop, they would be square; but, after being stored in a dry place, say for a year, it would then be seen that a great change had taken place both in the form and in some of the dimensions; the lines *c a*, *c b*, would be the same length as before, but it would have contracted from *a* to *b* very considerably, and the two lines *c a*, and *c b*, would not be at right angles to each other by the portion here shown in white in Fig. 3. The medullary rays are thus brought closer by the collapsing of the vertical fiber.

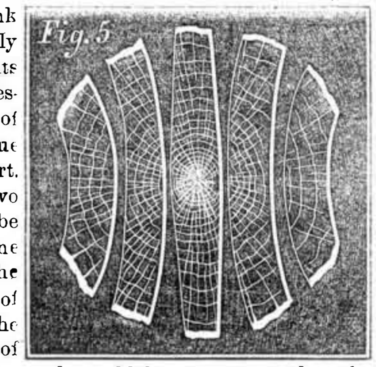


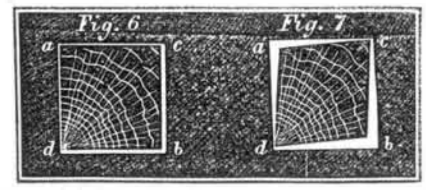
But, supposing that six parallel saw cuts are passed through the tree so as to form it into seven planks, as shown in Fig. 4, let us see what would be the behavior of the several planks. Take the center plank first. After due seasoning and contracting, it would then be found that the middle of the board would still retain the original thickness, from the resistance of the medullary rays, while it would be gradually reduced in thickness toward the edges for want of support, and the entire breadth of the plank would be the same as it was at first, for the foregoing reasons, and as shown in Fig. 5.



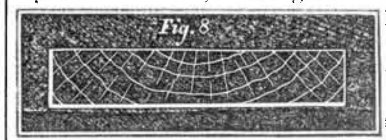
Then, taking the planks at each side of the center, by the same law their change and behavior would be quite different; they would still retain their original thickness at the center, but would be a little reduced on each edge throughout, but the side next to the heart of the tree would be pulled round or partly cylindrical, while the outside would be the reverse, or hollow, and the plank would be considerably narrower throughout its entire length, more especially on the face of the hollow side, all due to the want of support. Selecting the next two planks, they would be found to have lost none of their thickness at the center, and very little of their thickness at the edges, but very much of their breadth as planks, and would be curved round on the heart side and made hollow on the outside. Supposing some of these planks to be cut up into squares when in the green state, the shape that these squares would assume, after a period of seasoning, would entirely depend on the part of the tree to which they belonged; the greatest alteration would be parallel with the medullary rays. Thus if the square was near the outside, the effect would be as shown in Fig. 6,







namely, to contract in the direction from *a* to *b*, and after a year or two it would be thus, as seen in Fig. 7, the distance between *c* and *a* being nearly the same as they were before, but the other two are brought by the amount of their contraction closer together. By understanding this natural law, it is comparatively easy to know the future behavior of a board or plank by carefully examining the end of the wood, in order to ascertain the part of the log from which it has been cut, as the angle of the ring growths and the medullary rays will show thus, as in Fig. 8.



If a plank has this appearance, it will evidently show to have been cut from the outside, and for many years it will gradually shrink all to the breadth, while the next plank, shown in Fig. 9, clearly points close to the center or heart of the tree, where it will not shrink to the breadth but to a varying thickness, with the full dimensions in the middle, but tapering to the edges, and the planks on the right and left will give a mean, but with the center sides curved round, and the outside still more hollow.

The foregoing remarks apply more especially to the stronger exogenous woods, such as beech, oak, and the stronger home firs. The softer woods, such as yellow pine, are governed by the same law, but in virtue of their softness another law comes into force, which to some degree affects their behavior, as the contracting power of the tubular wood has sufficient strength to crush the softer medullary rays to some extent, and hence the primary law is so far modified. But even with the softer woods, such as are commonly used in the construction of houses, if the law is carefully obeyed, the greater part of the shrinking, which we are all too familiar with, would be obviated, as the following anecdote will serve to show: It was resolved to build four houses, all of the best class, but one of the four to be pre-eminently good, as the future residence of the proprietor. The timber was purchased for the entire lot, and the best portions were selected for house No. 1, but by one who did not know the law, and to make certain of success this portion of the wood had an extra twelve months' seasoning after it was cut up. The remainder of the wood was then handed over to a contractor for the other three houses, who han an intelligent young foreman, who knew the structure of wood as well as how to obey the law, and who, therefore had the wood for the three houses cut up in accordance therewith. The fourth house was built the following year by another man; but long before ten years had passed to the great surprise and annoyance of the proprietor, it was found that his extra good house, No. 1, had gone in the usual manner, while the other three houses were without a shrinkage from top to bottom. As Solomon says, "Wisdom is profitable to direct."

A similar want of correct knowledge of the natural figure and properties of the structure of wood, such as the oak, is constantly shown by the imperfect painting to resemble that wood, as exhibited on the doors and shutters of many of the houses of this metropolis. If we cannot afford to have genuine wainscot doors, as in France, but yet desire to have an imitation, it would surely be worth the trouble to have a block cut from the quarter of an oak tree, and to have each of its six sides planed and polished, in order to make plain their several features. The house painter would then see what nature really is, and thus save us from the ridicule of other nations, when we mix up "silver grains" and all the other natural features upon one side of a board or panel.

On Cotton-seed Oil, and its Detection when mixed with other Oils.

Mr. Reynolds believes that nearly the whole of cotton-seed oil is used in the sophistication of oils of older repute. The probability that the supply will now continue and increase is especially indicated by a consideration of the source of the oil. The weight of seed yielded by each cotton plant is about three times as great as the cotton obtained from it, and up to the present time nearly the whole of this seed has been wasted, or returned to the soil as a fertilizer. The present price of the refined oil is less than three shillings per gallon, and, considering the large porportion of seed that has yet to be utilized, it is probable that it will long continue to be the cheapest fixed oil in the market. Hence the desirability of our giving some attention to a substance which is pretty sure to present itself to us in our daily avocations in some shape or other.

After describing the methods of preparing and purifying cotton-seed oil, Mr. Reynolds adds some remarks upon the detection of this oil when mixed with olive oil. A well-known chemist, whom he regarded as the highest authority upon the subject of the adulteration of oils, told him that he did not know of a test for this purpose.

The experiments which he made induced him to regard the